Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

M.E Sem-I Remedial Examination April 2010

Subject code: 710203

Subject Name: Information Theory and Coding

Date: 08 / 04 / 2010 **Time: 12.00 noon – 02.30 pm**

Total Marks: 60

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1	**(a)**	Explain PDF (probability density function) and CDF (cumulative distribution function) for a continuous RV (random variable) and state their properties.	**06**
	(b)	Explain the moment generating function for a continuous RV and its application giving an example.	**06**
Q.2	**(a)**	Explain binomial RV and determine its mean and variance.	**06**
	(b)	If RVs X and Y are statistically independent and jointly Gaussian distributed with zero mean and equal variance. Derive the expression for their joint and individual PDFs.	**06**
		OR	
	(b)	Explain the procedure for transforming the distribution of a continuous RV from one type to another type.	**06**
Q.3	**(a)**	Explain cross-correlation of two random processes and its significance in information theory and coding.	**06**
	(b)	Explain PSD (power spectral density) and estimation of PSD for a wide sense stationary random process.	**06**
		OR	
Q.3	**(a)**	Explain uncertainty, information and entropy.	**06**
	(b)	Derive the condition for maximum entropy for a binary source.	**06**
Q.4	**(a)**	Explain n-th extension of a source and its effect on entropy.	**06**
	(b)	Explain Markov process and its significance.	**06**
		OR	
Q.4	**(a)**	Explain instantaneous codes giving an example.	**06**
	(b)	Derive Huffman code of a source generating four symbols with probabilities 0.5, 0.25, 0.125, and 0.125.	**06**
Q.5	**(a)**	Explain block codes giving an example.	**06**
	(b)	Explain cyclic codes with an example.	**06**
		OR	
Q.5	**(a)**	Draw a functional block diagram for JPEG compression.	**04**
	(b)	Explain public key and private key in cryptography.	**04**
	(c)	Explain Hamming distance giving a few examples.	**04**

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